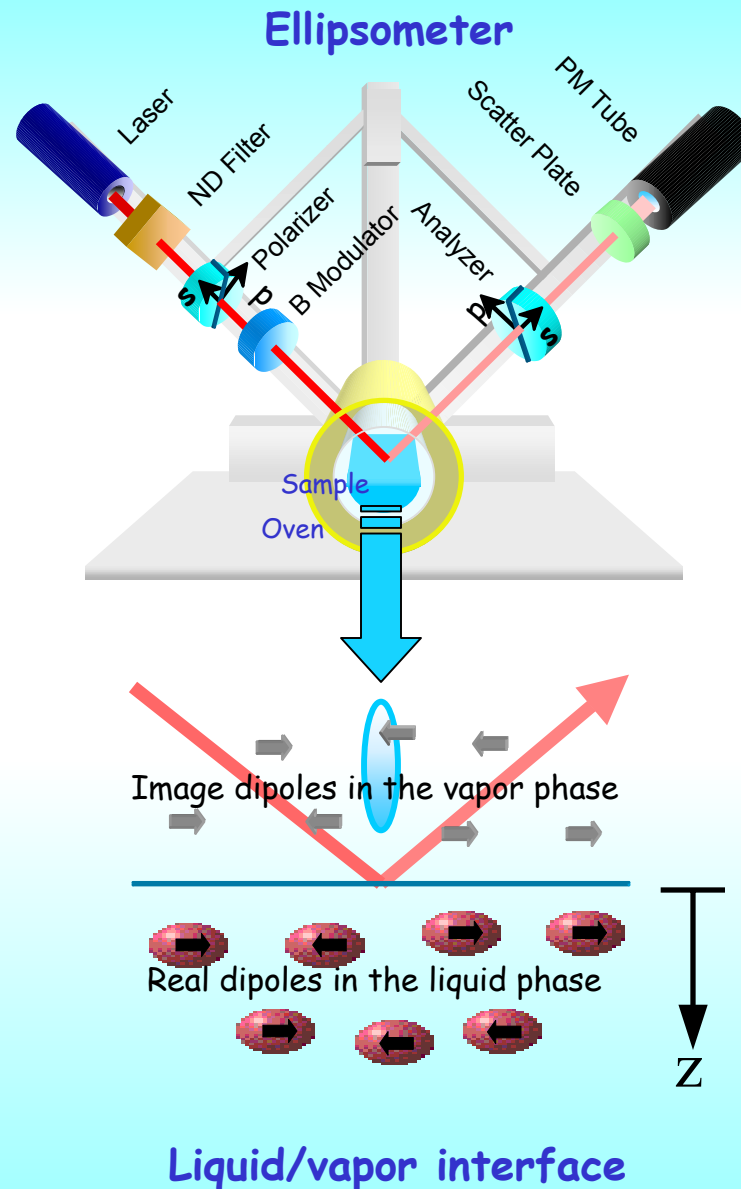


Interfacial Phenomena Near Phase Transitions 1

Bruce M. Law, Kansas State University, DMR-0097119

A fundamental issue, which is poorly understood, is ``How and why molecules orient in the vicinity of a surface?``. One mechanism, which will cause surface orientation, is the interaction of a highly polar molecule with its image dipole (essentially its ``mirror image``) in the vicinity of a surface. We have investigated this effect using ellipsometry by studying a critical binary liquid mixture, composed of nonpolar + highly polar molecules, near the mixture's critical temperature T_c .

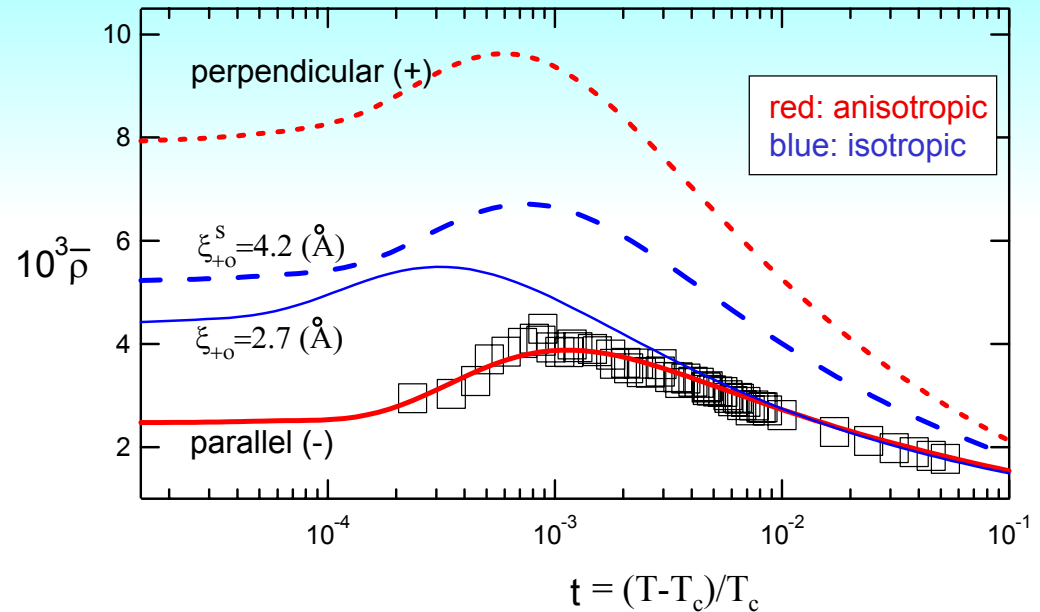


Interfacial Phenomena Near Phase Transitions 2

Bruce M. Law, Kansas State University, DMR-0097119

Educational:
2 undergraduates,
3 graduate students.

The phase modulated ellipsometer and an imaging ellipsometer are excellent tools for explaining fundamental concepts in optics. These instruments have been used not only as research instruments but also as teaching tools in two upper level optics courses taught by the PI. These courses were taken by a dozen graduate and undergraduate students from the Physics, Chemistry, and Engineering Departments.



Comparison of various adsorption / orientational order models with the highly polar + non-polar critical mixture 2-nitroanisole + cyclohexane (symbols): (i) isotropic adsorption models with bulk (solid blue line) or surface (dashed blue line) correlation length and (ii) anisotropic surface orientational order models with dipoles preferentially perpendicular (dotted red line) or parallel (solid red line) to the surface. This figure therefore indicates that the dipoles are repelled from the surface ($\xi_{+0}^s > \xi_{+0}$) with their orientation primarily parallel to the surface.